



THE EFFECTIVENESS OF GASTRO-SOLEUS STRETCHING PROGRAM IN GIRLS WEARING HIGH HEELS

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ABSTRACT **Introduction:** High heeled shoes (HHS) are not mere accessories of the feet, but an essential part of a woman's fashion that reflects her personality. High heels are a major source of chronic lower limb pain. Changing from flat footwear to high heels induces chronic muscle shortening associated with discomfort, fatigue, reduced shock absorption, and increased injury risk. **Objectives:** Purpose of study is to study the effect of stretching (manual and self) over gastro-soleus muscle in girls wearing high heels and to prepare effective protocol for muscle tightness in girls wearing high heels. **Methods:** Based on inclusion and exclusion criteria 40 subjects were enrolled for the study. The subjects were divided into two group-A (for control group) & group- B (self control group). Group A received passive stretching and Group B received Active Stretching. Ankle goniometry was used to assess the score. **Results:** The results showed that there is significant difference between the pre and post values in both soleus and Gastrocnemius. **Conclusion:** The study depicted that passive stretching has a significant effect on muscle shortening due to high heels than active stretching.

KEYWORDS : Muscle tendon Unit, stretching, goniometry

INTRODUCTION

Wearing high heels (HH) places the calf muscle-tendon unit (MTU) in a shortened position. As muscles and tendons are highly malleable tissues, chronic use of HH might induce structural and functional changes in the calf MTU.¹

Concerns regarding the potential impact of high heels on women's health have been expressed in medical circles for over 50 years² and in 2001 podiatrist William Rossi declared footwear to be the primary cause of foot disorders.³ Studies have shown that wearing HH can lead to slower self-selected walking speed, shorter step length, and smaller stance phase duration, while it increases ankle plantar flexion, knee plantar flexion, anterior pelvic tilt, and trunk extension.⁴

Wearing high heels places the calf MTU in a shortened position as muscles and tendons are highly malleable tissue chronic use of high heels might induce structural and functional changes in the calf MTU. It is worthy to note that substantial bodily adjustments have been observed due to wearing HH, e.g., change in the neuromuscular activation pattern, shortening of the gastrocnemius muscle fascicle muscles, increase in the Achilles tendon stiffness, and higher muscle activity of the soleus, tibialis anterior, and medial gastrocnemius.⁵

The tightness typically lessens with increasing activity (eg, walking, running).

Consequently, any change in the contractile behaviour of the plantar flexor muscle induced by long term use of high heels might indirectly also effect tendon mechanical properties. Zollener et. Al.⁷ in their study concluded that raising the heel by 13 cm reduces the length of the muscle-tendon unit by 12 mm or 3%.

Stretching is frequently utilized as a conservative treatment for muscle tightness. The implementation of a routine stretching program targeted at the gastrocnemius musculotendinous unit has an impact on Achilles tendon tightness and ankle dorsiflexion flexibility.⁶

The study aimed to identify the effect of stretching (manual and self) over gastro-soleus muscle in girls wearing high heels and to prepare effective protocol for muscle tightness in girls wearing high heels.

METHODOLOGY

Study design:

This study is a survey type study which intended to find the effect of Stretching (manual and self) in the girls wearing high heels.

Sampling Technique:

A sample of 40 subjects (from community i.e. group-a & group-b 20-20 in each group) 20-30 years of age girls wearing heels randomise control sampling method, they were collected from community. All subjects signed a consent form & were ready to take part in the study. The subjects were given the instructions regarding the procedure & the subjects who full fill the inclusion criteria & were ready to actively participate were selected.

Source of data:

Subjects were collected among Students of various colleges and working Ladies in Dehradun.

ELIGIBILITY

INCLUSION CRITERIA

1. This include Normal young girls (age 20- 30years)
2. Subject had to have worn high heels with a minimum level of heel height of 5 cm at least 5 times a week in daily life.
3. Capable to understand the instructions given by researcher.

EXCLUSION CRITERIA:

1. If any type of injury, like fracture in lower extremity.
2. Pain or other inflammatory signs around the concerned region.
3. Muscle adhesion
4. Spasm
5. Pregnant lady

PROCEDURE

The subjects were introduced to the study followed by signing of consent form, general assessment regarding the socio-demographic data (name, gender, age, education level, post medical history, & personal history, family history) were gathered in participants assessment form were divided into two group-A (for control group) & group- B (self control group) for comparison & total 20 number of subjects data was collected in each group i.e. group-'A' & group-'B' so overall sample size was 40. The subjects were assigned a number to maintained the confidentiality of subjects & then the proper assessment was used to assess the tightness of muscle, than the ranges of joint was noted down pre and post stretching & the score was collected. Group A received Passive stretching while Group B was taught self stretches.

The data was collected; Ankle goniometer was used to assess the score & was collected by the primary investigator & entered into data collection form.

RESULTS

Paired t-test was applied to compare the data, ROM score in between

two groups i.e. group-'a' for control group & group 'b' for self control group & the scores were compared for joint ROM.

SPSS version 12.0 was used for data analysis & in this study p value of ≤ 0.05 has been considered as statistical significant.

Table no. 1 Paired Samples Statistics for soleus

	Mean	N	Std. Deviation	Std. Error Mean	Sig.
control group					0.36
• pre test	15.45	20	.945	.211	
• post test	17.50	20	.889	.199	
experimental group					0.11
• pre test	14.90	20	.852	.191	
• post test	15.80	20	.951	.213	

Table no. 2 Paired Samples Statistics for gastro

	Mean	N	Std. Deviation	Std. Error Mean	Sig.
control group					0.50
• pre test	.00	20	.000	.000	
• post test	8.00	20	.918	.205	
experimental group					0.01
• pre test	6.50	20	.946	.212	
• post test	7.05	20	.945	.211	

DISCUSSION

High-heeled shoes (high heels) are a powerful symbol of modern female sexuality. Wearing heels have its own affects on foot. When the foot is positioned in a high-heeled shoe, several changes can be observed. The ankle joint axis moves anteriorly and the line of gravity moves posteriorly toward the ankle joint. There is severe shortness of Tendo Achillis.

The result of the current study suggest that the addition of stretching protocols results in superior short term outcomes, compared to those of self stretching alone, in the treatment of individuals wearing High Heels on daily basis.

In addition, the magnitude of this benefit was clinically important. The exact mechanism of the efficacy of stretching in the management of the tightness of the gastro-soleus is unclear. But they may be related to a decrease in tension over the gastro-soleus and restricted ankle dorsi flexion⁵ therefore, the current study further supports stretching of the calf as being improving function, atleast in the short term. Various theories have been proposed to explain increases in muscle extensibility observed after intermittent stretching. Most of these theories advocate a mechanical increase in length of the stretched muscle.⁸

The results showed that there is significant difference between the pre and post values in both soleus and Gastronemius of Group B (Table 1 and table 2). The results of present study are supported by Nakamura and Ichihashi in their study where they concluded that that 5 min of SS affects MTU and muscle stiffness both immediately and 10 min after SS, which may be associated with a change in the connective tissue properties.⁹ according to Takeuchi et al. the static stretching load had significant effects on changes in the ROM and muscle-tendon unit stiffness, and high-intensity static stretching was useful for improving the flexibility because of its high static stretching load.¹⁰

CONCLUSION

Results of the study shows the There is a significant difference in control group but there is no significant difference in experimental group of soleus and gastrocnemius. This depicts that women having muscle shortening due to wearing of high heels should be preferably treated by passive stretching.

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CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to research, authorship and/or publication of this article.

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